

What is claimed is:

1 1. A method of forming a FinFET comprising the steps of:
2 forming a set of fins having a fin height and a fin thickness on a silicon
3 substrate;
4 forming a gate, having a gate height greater than said fin height and
5 intersecting said fin in a body area and separated therefrom by a gate
6 insulator;
7 depositing a first temporary material up to a first level above the top of said
8 fin and below said gate height;
9 forming a conformal layer over said gate;
10 using said conformal layer as a hardmask, etching said temporary material,
11 thereby forming a composite gate cover over said gate and exposing sides of
12 said fins; and
13 increasing said fin thickness while said gate is isolated from said set of fins
14 by said gate cover.

1 2. A method according to claim 1, in which said fins are formed from
2 silicon, said first temporary material is oxide and said conformal layer is
3 nitride, whereby said composite layer comprises oxide in a lower portion
4 and nitride in an upper portion.

1 3. A method according to claim 2, further comprising a step of etching

2 said oxide in said lower portion with a method selective to nitride, thereby
3 reducing a thickness of said oxide in said lower portion.

1 4. A method according to claim 3, in which said oxide in said lower
2 portion is reduced to a first thickness in N-type FinFETs and to a second
3 thickness in P-type FinFETs.

1 5. A method according to claim 1, in which said step of increasing said
2 fin thickness is performed by epitaxial growth on poly fins.

1 6. A method according to claim 5, in which said fins are formed from
2 silicon, said first temporary material is oxide and said conformal layer is
3 nitride, whereby said composite layer comprises oxide in a lower portion
4 and nitride in an upper portion.

1 7. A method according to claim 6, further comprising a step of etching
2 said oxide in said lower portion with a method selective to nitride, thereby
3 reducing a thickness of said oxide in said lower portion.

1 8. A method according to claim 7, in which said said oxide in said lower
2 portion is reduced to a first thickness in N-type FinFETs and to a second
3 thickness in P-type FinFETs.

1 9. A method according to claim 1, in which said silicon substrate is a
2 SOI substrate having a device layer of silicon above a layer of buried

3 insulator and said fins are formed in said device layer.

1 10. A method according to claim 9, in which said fins are formed from
2 silicon, said first temporary material is oxide and said conformal layer is
3 nitride, whereby said composite layer comprises oxide in a lower portion
4 and nitride in an upper portion.

1 11. A method according to claim 10, further comprising a step of etching
2 said oxide in said lower portion with a method selective to nitride, thereby
3 reducing a thickness of said oxide in said lower portion.

1 12. A method according to claim 11, in which said oxide in said lower
2 portion is reduced to a first thickness in N-type FinFETs and to a second
3 thickness in P-type FinFETs.

1 13. A method of forming a FinFET comprising the steps of:
2 forming a set of fins having a fin height and a fin thickness on a silicon
3 substrate;
4 forming a gate, having a gate height greater than said fin height and
5 intersecting said fin in a body area and separated therefrom by a gate
6 insulator;
7 depositing a first temporary material up to a first level at said gate height;
8 recessing said temporary material to a height below said gate height and
9 above said fins;
10 forming a conformal cap over said gates and fins:

11 using said conformal cap as a hardmask, etching said temporary material,
12 thereby exposing said fins; and
13 increasing said fin thickness while said gate is isolated from said set of fins
14 by said cap.

1 14. A method according to claim 13, in which said fins are formed from
2 silicon, said first temporary material is oxide and said conformal layer is
3 nitride, whereby said composite layer comprises oxide in a lower portion
4 and nitride in an upper portion.

1 15. A method according to claim 14, further comprising a step of etching
2 said oxide in said lower portion with a method selective to nitride, thereby
3 reducing a thickness of said oxide in said lower portion.

1 16. A method according to claim 15, in which said oxide in said lower
2 portion is reduced to a first thickness in N-type FinFETs and to a second
3 thickness in P-type FinFETs.

1 17. A method according to claim 13, in which said step of increasing said
2 fin thickness is performed by epitaxial growth on poly fins.

1 18. A method according to claim 17, in which said fins are formed from
2 silicon, said first temporary material is oxide and said conformal layer is
3 nitride, whereby said composite layer comprises oxide in a lower portion
4 and nitride in an upper portion.

1 19. A method according to claim 18, further comprising a step of etching
2 said oxide in said lower portion with a method selective to nitride, thereby
3 reducing a thickness of said oxide in said lower portion.

1 20. A method according to claim 19, in which said oxide in said lower
2 portion is reduced to a first thickness in N-type FinFETs and to a second
3 thickness in P-type FinFETs.

1 21. A method according to claim 13, in which said silicon substrate is a
2 SOI substrate having a device layer of silicon above a layer of buried
3 insulator and said fins are formed in said device layer.

1 22. A method according to claim 21, in which said fins are formed from
2 silicon, said first temporary material is oxide and said conformal layer is
3 nitride, whereby said composite layer comprises oxide in a lower portion
4 and nitride in an upper portion.

1 23. A method according to claim 22, further comprising a step of etching
2 said oxide in said lower portion with a method selective to nitride, thereby
3 reducing a thickness of said oxide in said lower portion.

1 24. A method according to claim 23, in which said oxide in said lower
2 portion is reduced to a first thickness in N-type FinFETs and to a second
3 thickness in P-type FinFETs.